

We claim:

1. A method for forming splines on a metallic tube, comprising the steps of:
 - (a) providing a metallic tube having properties approaching or corresponding to T4 temper;
 - (b) heating said metallic tube to a temperature sufficient to remove the T4 temper;
 - (c) quenching said metallic tube;
 - (d) forming splines on said metallic tube; and
 - (e) artificially or naturally aging said metallic tube.
2. The method of claim 1 in which (a) includes providing an aluminum alloy selected from the 2000, 6000, or 7000 series.
3. The method of claim 1 in which (a) includes selecting an alloy selected from the group consisting of 6013, 6061 and 6063; 7003, 7108 and 7029.
4. The method of claim 1 in which (a) includes providing tube formed by extrusion
5. The method of claim 1 in which (a) includes providing a drawn seamless tube.

6. The method of claim 1 in which (a) includes providing a tube formed from an elongated sheet product that is rolled in a circular configuration and then welded to form a tube.

7. The method of claim 1 in which (b) includes heating said metallic tube to a temperature between about 650° to about 1,000°F.

8. The method of claim 1 in which (b) includes heating said metallic tube in an electric induction furnace.

9. The method of claim 1 in which (b) includes heating said metallic tube in an induction coil.

10. The method of claim 1 in which (b) includes heating a said metallic tube in an induction coil that covers a length up to 95% of the length of said metallic tube.

11. The method of claim 1 in which (b) includes rotating said metallic tube during the heating process.

12. The method of claim 1 in which (b) includes heating only a section of said metallic tube.

13. The method of claim 1 in which (b) includes heating two or more sections of said metallic tube and there is a non-heated section between said two or more sections.

14. The method of claim 1 in which (c) includes quenching said metallic tube.

15. The method of claim 1 in which (c) includes quenching said metallic tube to temperatures approaching and to room temperature.

16. The method of claim 1 in which (c) includes quenching said metallic tube in a tank having a temperature less than about 212°F.

17. The method of claim 1 in which (c) includes quenching said metallic tube includes immersion quenching, spray quenching and mist quenching.

18. The method of claim 1 in which (c) includes quenching said metallic tube using a quenchant solution selected from the group consisting of water, polymer, air, gaseous quenchants and combinations thereof.

19. The method of claim 1 in which (d) includes forming said splines within 16 hours of said quenching if said metallic tubes are stored at room temperature.

20. The method of claim 1 in which (d) includes forming said splines within 8 hours of said quenching if said metallic tubes are stored at room temperature.

21. The method of claim 1 in which (d) includes cooling said quenched metallic tube below room temperature to retard natural aging.

22. The method of claim 1 in which (e) includes artificial aging said tube for a given time at a given temperature to achieve T6 or near T6 properties.

23. method for forming splines on a metallic tube, comprising the steps of:

- (a) forming a metallic tube;
- (b) solution heat-treating said metallic tube;
- (c) controlling time and/or temperature exposure conditions of said metallic tube so that a T4 temper is not achieved;
- (d) forming splines on said metallic tube before said metallic tube has aged sufficiently to develop properties corresponding to a T4 temper; and
- (e) aging said metallic tube.

24. The method of claim 23 in which (a) includes forming an aluminum alloy from the 2XXX, 6XXX or 7XXX series.

25. The method of claim 23 wherein step (a) includes forming an aluminum alloy tube by selecting an alloy from the group consisting of 6013, 6061 and 6063; 7003, 7108 and 7029.

26. The method of claim 23 in which step (a) includes extruding a tube.

27. The method of claim 23 in which step (a) includes drawing a seamless tube.

28. The method of claim 23 in which (a) includes forming a tube from an elongated sheet product that is rolled in a circular configuration and then welded to form a tube.

29. The method of claim 23 in which step (a) includes solution heat treating the tubes by a direct quench process from an elevated hot working process or by separate solution heat treating.

30. The method of claim 23 in which steps (b) and (c) include cooling said metallic tube to room temperature.

31. The method of claim 23 in which steps (b) and (c) includes cooling said metallic tube by at least 5°C below room temperature to retard natural aging.

32. The method of claim 23 in which step (d) include forming said splines within about 12 hours after completion of step (b) and said metallic tubes are stored at about room temperature.

33. The method of claim 23 in which step (d) includes forming said splines within about 8 hours after completion of step (b) and said metallic tubes are stored at room temperature.

34. The method of claim 23 in which step (d) includes forming said splines by use of a cold forming process.

35. The method of claim 23 in which step (e) includes naturally aging said tube to full/stable T4 conditions.

36. The method of claim 23 in which step (d) includes artificially aging said tube to full/stable T6 conditions.

37. The method of claim 23 in which step (d) includes artificially aging said tube at a temperature of at least about 300°F for about 4 hours.

38. The method of claim 23 which further comprises hardening of said splines by use of an anodizing process.

39. The method of claim 23 which further comprises anodizing said splines with a hardening material having a thickness of at least about 0.002 inches.